Swift trust and commitment: the missing links for humanitarian supply chain coordination?

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Swift trust and commitment: The missing links for humanitarian supply chain coordination?

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Abstract

Coordination among actors in a humanitarian relief supply chain decides whether a relief operation can be or successful or not. In humanitarian supply chains, due to the urgency and importance of the situation combined with scarce resources, actors have to coordinate and trust each other in order to achieve joint goals. This paper investigated empirically the role of swift trust as mediating variable for achieving supply chain coordination. Based on commitment-trust theory we explore enablers of swift-trust and how swift trust translates into coordination through commitment. Based on a path analytic model we test data from the National Disaster Management Authority of India. Our study is the first testing commitment-trust theory (CTT) in the humanitarian context, highlighting the importance of swift trust and commitment for much thought after coordination. Furthermore, the study shows that information sharing and behavioral uncertainty reduction act as enablers for swift trust. The study findings offer practical guidance and suggest that swift trust is a missing link for the success of humanitarian supply chains.

Keywords: *Humanitarian Supply Chains; Swift Trust; Coordination; Trust-Committment Theory; Covariance-Based SEM.*

1. Introduction

Disasters displace people, disrupt lives and cause human and economic losses. Per a recent study by the United Nations Food and Agriculture Organization between 2003 and 2013 natural disasters caused a total of $1.5 trillion in damages worldwide, having led to more than 1.1 million deaths and having affected the lives of more than two billion people (FAO, 2015). An effective response to a disaster necessitates a supply chain approach where relief items are sourced, procured, moved, stored and delivered in ways that minimizes human suffering (Van Wassenhove, 2006; Gajendran and Oloruntoba, 2017). In this paper, we refer with humanitarian relief supply chains to the operations of humanitarian actors (e.g. local and international non-governmental organizations (NGOs), Red Cross, local government, invited military forces etc.) responding to a large scale humanitarian event with the purpose of delivering food, water and non-food items like shelter to the affected communities (Banomyong et al. 2016; Burkart et al. 2016). In this paper, large scale humanitarian events refer to natural or man-made disasters that exceed the response capacity and capabilities of local jurisdictions.

In general, it can be argued that humanitarian relief supply chains (HRSCs) share the same guiding principles with commercial supply chains like moving the right goods and services, to the right place, at the right time, and the right cost, but unlike commercial supply chains, HRSCs operate under highly dynamic and politically charged conditions (Ulku et al. 2015; Jabbour et al. 2017). For example, with the European Union negotiating a deal with Turkey to stop the flow of refugees into the EU, UNHCR had to alter their whole supply chain in Greece designed to serve populations on the move, to a supply chain designed to serve dispersed but static groups of people, like supplying refugee camps (The New York Times, 2016) . An additional challenge for HRSCs is information. Immediately after a disaster, information on survivor needs, accessibility of roads and alternative routes can be unavailable, incomplete or unreliable (Swanson and Smith, 2013). But most importantly, HRSCs have a different objective function, which is to minimize deprivation cost defined as "the suffering brought about by the lack of goods and services" (Holguin-Veras *et al*., 2012, p. 498).

While the direct impact of natural disasters on human life and property could be reduced by proper investment in mitigation and preparedness, the effectiveness of post-disaster relief to survivors can be undermined by poor management (Ozdamar et al. 2004; Altay, 2008; Coles et al. 2017; de Camargo et al.). Suffering of the affected population may be prolonged due to lack of coordination among humanitarian actors responding to the event (Jin et al. 2015). A poorly managed, uncoordinated response will result in duplication of efforts, waste of resources and slow and inequitable distribution of aid. As no single organization has sufficient resources to respond effectively to a major disaster, a quick, organized response requires a coordinated effort (Balcik *et al*., 2010; Moshtari, 2016). The sheer number and diversity of humanitarian actors converging at a disaster site at the same time makes coordination difficult. For example, over 40 governments and more than 700 NGOs provided humanitarian assistance following the Indian Ocean Tsunami in late 2004/early 2005 (Chia, 2007). The United Nations Office of Coordination for Humanitarian Assistance (OCHA) recognized the inadequate initial international response to the Indian Ocean Tsunami and initiated the Humanitarian Response Review process in 2005. The review team identified poor coordination among humanitarian actors as one of the key problems in humanitarian assistance. In response, OCHA established the cluster approach as UN's coordination mechanism (Jahre and Jensen, 2010).

Coordination can only happen if the organizations involved are committed to it. Kabra and Ramesh (2015) listed commitment as one of the key drivers of coordination. Within the commercial context commitment and coordination have been found to positively influence each other (Hoegl *et al*., 2004). Furthermore, following the notion of trust-commitment theory (Morgan and Hunt, 1994) – which is the key guiding theoretical framework for our investigation – trust is the key antecedent for commitment to emerge. We therefore suggest with our work that trust and commitment as enabling variables need to be studied in HRSCs context. The relationships of trust and commitment have not been empirically explored within the humanitarian context, though Tatham and Kovacs (2010) argued that HRSCs are often hastily formed due to the unpredictable nature of the events and the actors must quickly form trust between them. This so-called swift is therefore one of the centrepieces of our investigation.

Kunz and Reiner (2012) have conducted a meta-analysis of humanitarian literature and noted that case research and survey based studies are scant. The existing humanitarian relief supply

chain literature lacks empirical studies focused on theory building to better understand the dynamics of HRSCs. Hence, our research is motivated by this fact. In short, we argue that there is a need for theory-based empirical research on coordination of humanitarian relief supply chains. Hence, extending further the work of Morgan and Hunt (1994) to the HRSCs domain we draw upon another antecedents for trust from their work to test and inform also practice how swift trust can be built. Morgan and Hunt list communication and absence of opportunistic behavior as major antecedents that trust can emerge. Information sharing refers to the creation and dissemination of situational information by humanitarian organizations (Constantinides, 2013). Altay and Labonte (2014) explored impediments to information flow among humanitarian actors based on lessons learned reports for Haiti response. Altay and Pal (2014) showed via simulation how having the cluster lead organization act as a centralized processor of information in combination with cluster participants' willingness to share information improves diffusion of relevant information to all cluster participant organizations and facilitate a coordinated response. What has not been considered yet in the humanitarian relief supply chain management literature is the relationship between swift trust and information sharing. One of the objectives of this paper is to explore this link. Hence, in this paper we focus on swift-trust and coordination among the actors in HRSCs and address the first question: *what are the distinct and joint effects of information sharing and behavioral certainty on swift-trust?*

Boyd et al. (2012) argues that direct effects are crucial, but they seem incapable of explaining the complexity of the reality. Hence, based on previous scholars arguments (see, Sousa and Voss, 2008; Eckstein et al. 2015), the performance effects of certain supply chains hinge on the mediating effect of the environmental context. The empirical research on supply chain coordination has however, largely neglected the impact of relational constructs like swift-trust. In this regard we specify our second research question as follows: *what is the effect of swift-trust on the coordination among actors in HRSCs?*

By empirically validating a theoretically derived framework, this study offers three major contributions to the HRSCs literature. First, we investigate the relationships between information sharing, swift trust and commitment and their connection to coordination within the HRSCs context. Out of these four constructs, commitment along with their connection to coordination have not been explored within the HSRCs literature. Second, the relationship between swift trust

and information sharing has not been clarified. For example, Altay and Pal (2014) have modeled trust as an antecedent to information sharing and did not find statistically significant support through their simulation experiments. This paper, on the other hand models information sharing as an antecedent to trust (specifically, swift-trust) and supports it with empirical evidence. And third, we enrich the HRSCs literature by conducting a theory focused empirical study.

The paper is organized as follows. The next section deals with underlying theory and the theoretical framework. We follow with an outline of our research methodology. Next, data is analyzed, followed by a discussion of results, theoretical contributions and managerial implications. In the final section we conclude the paper and discuss limitations and further research directions.

2. Theoretical Framework and Research Hypotheses

Humanitarian relief supply chain management is a young discipline. Tabaklar *et al*. (2015) argue that to advance the HRSC literature theories from other disciplines need to be borrowed. We have looked at a wide range of literature from across disciplines to extract the constructs in the conceptual framework shown in Figure 1. Our theoretical framework commitment-trust theory (CTT) and swift trust (ST).

Though initially developed for the context of relationship marketing, CTT has been adopted for the investigation of international relations of firms (Friman *et al.* 2002), the not-for profit sector (MacMillan et al. 2005), IT outsourcing (Goo and Huang, 2008), knowledge sharing (Hashim and Tan, 2015), supply chain management (Kwon and Suh, 2005) or purchasing (Gao *et al.* 2005). The central tenet of CTT is that it is now power, but trust and commitment that decide upon the successfulness of relationships (Morgan and Hunt, 1994).

For example, Akhtar *et al*. (2012) suggested that tangible (finance, technology, and people) and intangible (leadership, extra efforts, relevant experiences, education, relationship management skills, research abilities, and performance measurement skills) organizational factors play an enabling role in coordination. Similarly, Kabra and Ramesh (2015) identified drivers of coordination in HRSCs as strategic relations between actors, commitment from the actors, use of information technology, regular meetings between actors, building a trustworthy environment, mutual learning, cultural cohesion and cooperation among actors, training, transparency, performance evaluation systems, and feedback mechanisms. Balcik *et al*. (2010) on the other hand,

turned their attention to barriers to coordination and listed the number and diversity of actors, donor expectations and funding structure, competition for funding, impact of media, unpredictability, resource scarcity/oversupply, and the cost of coordination as potential inhibitors.

Swift trust is a form of trust occurring in temporary teams (Meyerson *et al.*, 1996), particularly when there is time pressure or achieving project goals is of great importance (Mishra, 1996). HRSCs engage host governments, the military, local and international relief organisations, and private sector companies, each of which may have different interests, mandates, capacities and logistics expertise (Balcik *et al*., 2010). These humanitarian actors converging to the same location at the same time to coordinate a relief operation demands rapid building of trust (Tatham and Kovacs, 2010). Trust is an important factor for the success of supply chain relationships (Laaksonen *et al*., 2009; Barratt, 2004; Fawcett *et al*., 2008; Capaldo and Giannoccaro, 2015; Moshtari, 2016). Lu *et al*. (2016a) argued that trust in the marketplace enhances the intention to engage with the market place. Lu *et al*. (2016b) further argued that trust is a central aspect in many economic transactions that can involve social uncertainty and risk. Tatham and Kovacs (2010) pointed out that such trust is developed over a period of time, but actors in HRSCs usually do not have this time available. Hence, in case of hastily formed networks, trust or swift-trust may not have the same positive influence as it has in commercial supply chains.

This paper explores the relationships between information sharing, swift trust, commitment, and the relationship between commitment and coordination. Below we derive these linkages. To the best of our knowledge this model has not been tested in the humanitarian context before.

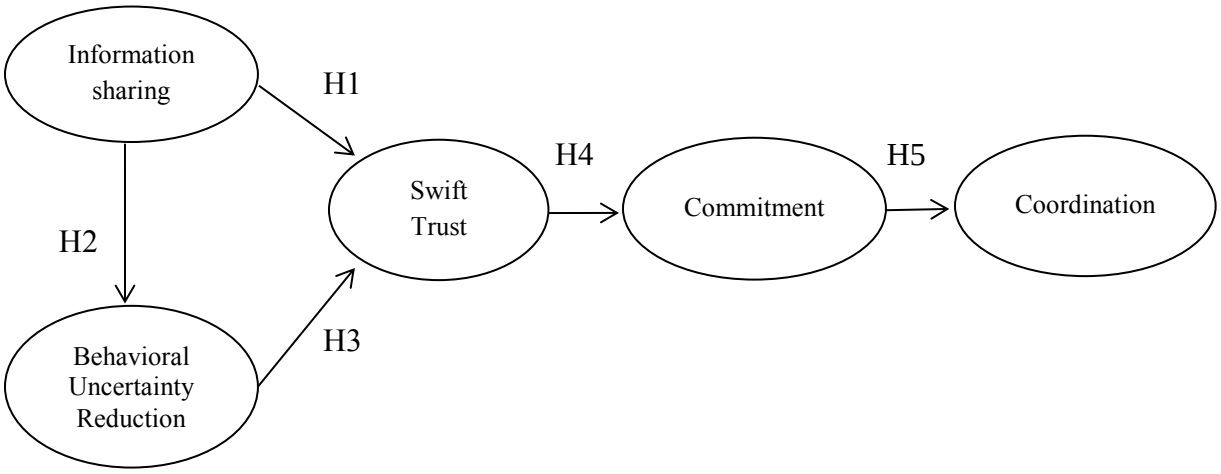


Figure 1: Conceptual Framework

2.1 Information Sharing and Swift Trust among Actors

Information sharing among actors creates transparency, i.e. humanitarian actors sharing information about their available capabilities and resources helps everyone understand their role in a coordinated response. One example is the 3W (who does what where) databases OCHA creates and publishes after a disaster. And there is evidence in leadership literature that transparency improves trust (Norman *et al*., 2010). Furthermore, Hung *et al*. (2004) mention availability of information about third-parties as a factor in establishing trust. Therefore, we infer that information sharing can improve trust.

Meyerson *et al*. (1996) have made a case for the need for swift trust among members in a temporary group. Swift trust is defined as the willingness to rely upon team members to perform their formal and informal roles in a hastily formed temporary team (Zolin, 2002). Especially important is the direction of relationship between information sharing and swift trust. Altay and Pal (2014) proposed that trust improves information sharing but did not find statistical evidence in support of their proposal. One reason for this may be the fact that they did not test swift trust. Trust in their study took time to build.

The theoretical reasoning according to CTT is that relevant, timely and reliable information will create trust. If this kind of information is provided it is easier to identify and solve conflicts in

a timely manner as well as to adapt to each other and adjust expectations to the other actor (Morgan and Hunt 1994).

In this study, we posit that information sharing improves building swift trust (not the other way around as Altay and Pal (2014) suggested) among actors of a humanitarian relief supply chain. Thus, we hypothesize:

H1: Information sharing among humanitarian actors increases swift trust.

2.2 Information Sharing and Behavioral Uncertainty Reduction

Behavioral uncertainty is defined as the inability to predict one's collaboration partners (adapted from Joshi and Stump, 1999). In our case partners refer to humanitarian organizations. Willamson (1985) argued that behavioral uncertainty happens due to lack of complete information about one's partners in a network. Thus, information sharing between partners could reduce behavioral uncertainty.

H2: Information sharing among humanitarian actors will reduce behavioral uncertainty.

2.3 Behavioral Uncertainty Reduction and Swift Trust

Van Der Horst and De Langen (2008) suggest that reduction in behavioral uncertainty could lead to better coordination. Although, the nature of the connection between reduction in behavioral uncertainty and coordination has not been well explained, the link between trust and behavioral uncertainty associated with a partner has been shown in supply chain literature (Dyer and Chu, 2003). It is reasonable to assume that the faster an organization knows who their collaboration partners are, the quicker they can build trust. Thus, behavioral uncertainty among partners should lead to improved swift trust.

H3: Behavioral certainty will improve swift trust.

2.4 Swift Trust and Commitment

Commitment is defined as the intention to continue a course of action or activity (Hocutt, 1998). Most humanitarian organizations understand that a more collaborative environment will help them utilize their resources more effectively in delivering relief to the affected population. Conway and Swift (2000) have identified trust and commitment as the two most important factors for building

coordination among actors. Wilson (1995) further supported this argument by identifying trust as an important building block in a relationship. Mietilla and Moller (1990) have argued that trust is the precondition for enhancing commitment. Morgan and Hunt (1994) also proposed that trust improves commitment, laying the foundation of CTT.

The underlying theoretical argument why trust nurtures commitment is that trust is a unique asset in real life that is scarce. Following Hrebiniak (1974), these relationships attracts actor investment as trust based relationships are highly valued. For example, in case of high trust actors won't over-monitor their counterparts and provide sufficient freedom for their operations. If a partners feels trusted he might pay more attention and value to the relationship, than he might do for a purely transactional relationship. Following the tenant of CTT we postulate also for the case that commitment almost follows automatically the emergence of trust.

We extend this argument into HRSCs and hypothesise that:

H4: Swift trust positively influences commitment of humanitarian actors.

2.5 Commitment and Coordination

Coordination in HRSCs is one of the subjects of debate in recent years (see, Balcik *et al*., 2010; Jahre and Jensen, 2010; Akhtar *et al*., 2012; Altay and Pal, 2014). Balcik *et al*. (2010) attempted to offer operational definition of coordination among various actors engaged in disaster relief work. Per Balcik *et al*. (2010, p. 23), "*coordination is defined as a degree of interactions among actors in humanitarian supply chain network operation within the relief environment*". Based on CTT, we suggest that actors, once committed to a relationship, would not easily opt for starting other relationship opportunistically. This allows partners in a relationship to establish joint routines and ways of working. Even though the time horizon of a relationship might still rather be short in HRSCs setting, actors might find it far easier to work together if they not that the other actor is prudent as they themselves are reciprocally committed to the relationship. This is particularly likely in the case of scarce resources and high time pressure like in the case of HRSCs as coordination might improve the outcome of the crisis significantly. Also, following the argumentation of Morgan and Hunt (1994) it is important to note that both trust and commitment have to be in place in order to facilitate collaborative practices such as coordination.

H5: Commitment among humanitarian actors has a positive impact on coordination.

3. Research Design

3.1 Construct Operationalization

To test our conceptual framework a survey instrument (see Table 1) was developed by identifying the appropriate measurements from literature. The constructs were measured on a five-point Likert scale with anchors ranging from strongly disagree (1) to strongly agree (5) in order to ensure high statistical variability among survey responses. We modified the nomenclature in the existing scales to make them more suitable to the context of HRSCs, since most of the measurement scales were developed for commercial supply chains. A panel of disaster management experts from the state government, military, and NGO's in India checked the survey for face and content validity. This review of the survey instrument also made sure that it does not contain irrelevant items and there are no ambiguities in wording. Table 1 presents the constructs used and the literature they were adapted from.

Additionally, we included control variables in our analysis. Heaslip *et al*. (2012) noted that cultural differences between civil and military may influence coordination between actors involved in disaster relief operations. Separately, Kovacs and Spens (2009) argued that the size of the organizations involved in disaster relief operations may influence coordination between them. Hence, to eliminate undesirable sources of variance, we controlled for organization type and size.

--- Insert Table 1 about here ---

3.2 Data Collection

The survey was administered to officers and managers in various organizations that are involved in disaster relief activities in India. Thus, admittedly the humanitarian relief supply chains considered in this study are limited to the context of India. However, India is a developing nation frequently exposed to natural disasters. Consequently, local and international NGOs and foreign militaries have been collaborating and continue to work together in delivering help to vulnerable populations. Therefore, due to the size, organizational diversity and exposure to a variety of disasters we believe that HRSCs in India provide an appropriate test bed to explore the dynamics of coordination among humanitarian partners.

In India, the National Disaster Management Authority (NDMA) is an agency under the Ministry of Home Affairs (MHA) that was created through the Disaster Management Act in 2005 to coordinate response to natural or man-made disasters and build capacity in disaster relief organizations in order to improve the national response to disasters. The NDMA is equivalent to FEMA in the USA. The National Institute of Disaster Management (NIDM) operates under NDMA and publishes a directory of organizations and resource persons involved in disaster management in India. Through this directory, we reached out to India's Ministry of Defense, Ministry of Railway (in India the Ministry of Railway has a disaster response team), Ministry of Health and Family Affairs, as well as to the Directors General of Police for the states of Uttarakhand, Maharashtra, Uttar Pradesh, and Tamil Nadu. We also contacted various NGOs that worked with these ministries on relief supply chains. We requested each of these organizations to distribute our questionnaire to their top managers and to those senior team members who had been involved in disaster relief activities.

This method of survey distribution is suitable considering India's unique social and cultural context because in India, collecting data from government-based organizations requires personal contacts. The use of authority figures as brokers/agents of survey distribution has its positives and negatives: its advantage is that high return rates can be expected. The disadvantage is that the degree of geographical diversity and reach is limited to the availability of contacts in key positions. The four states mentioned above were selected merely because we could identify personal contacts in the organizations in these states to help us distribute the survey.

Data was collected in two separate attempts. The first attempt happened between March and September 2015. A total of 157 questionnaires were distributed and 122 questionnaires were returned, with 117 complete and useable for data analysis (response rate 74.52%). Following Dillman's (2011) Total Design Method, initial mailings were followed by second mailings and follow-up phone calls if necessary. Unfortunately, the results of our analysis of this data only showed weak to moderate strength for the linkages in our theoretical framework. More importantly, we recognized that our survey was not capturing coordination properly (the questions in the original survey captured effectiveness of response but not necessarily coordination among humanitarian actors). Consequently, a new scale for coordination was developed based on Basnet (2013) (see Table 1). Since we asked our respondents to provide names and contact information

on our surveys, the 117 respondents to the original survey were contacted back and requested to answer the new questions on coordination. To further strengthen statistical power, an additional 300 questionnaires were sent out to NIDM members. This second attempt resulted in 70 complete surveys (response rate 23.33%). Thus, in total we received 187 usable responses out 457 questionnaires sent. This shows an effective response rate of 41 percent which is very high for supply chain management research and humanitarian supply chain research in particular. Profiles of the respondents are provided in Table 2.

--- Insert Table 2 about here ---

3.3 Nonresponse Bias Test

Armstrong and Overton (1977) argued that with survey data there is a possibility that the opinion of respondents may differ from the opinion of the recipients who did not respond to the survey. This introduces a bias to the results. In our case we split the collected data into two equal halves as suggested by Chen and Paulraj (2004) depending on the dates they were received. We assessed nonresponse bias using t-tests and found no significant differences between the two sets of data (p>0.05) indicating that non-response bias is unlikely, specifically as our response rate is very high too.

4. Data Analyses and Results

We first checked for constant variance, existence of outliers, and normality (Chen and Paulraj, 2004; Dubey and Gunasekaran, 2015). We also used plots of residuals by predicted values, rankits plot of residuals, and statistics of skewness and kurtosis (Cohen *et al.,* 2003). We found that the indicators for skewness and kurtosis are much lower than the specified limits in past research (Curran *et al.,* 1996; Kim and Malhotra, 2005; Dubey and Gunasekaran, 2015). Hence, we did not observe any significant deviations from the normality assumption. Additionally, to ensure that our data was free from multicollinearity, we calculated variance inflation factors (VIF). All the VIFs were less than the recommended threshold of 10.0, (Hair *et al*., 2006) suggesting that multicollinearity is not an issue in our data.

Our data comes from governmental and non-governmental organizations which differ largely in terms of size, culture, policies, structure, operating styles and role in response operations. We

checked if the data from these two groups of organizations differed significantly. We looked at R^2 and F-statistics between the 123 responses from government organisations (military, police and railway) and 64 responses from non-government organisations. We observed no significant difference in responses of these two groups as measured by R^2 and F-statistic. In the following section we explain our analysis of the model.

4.1 Measurement Model

To test the unidimensionality- the extent to which a set of indicators reflect a single underlying construct- was performed by satisfying two conditions (Gerbing and Anderson, 1998; Chen et al. 2004; Hair et al. 2006). Firstly, an item must be empirically attached with the empirical indicators of a construct, and , second it must be attached with one and only construct. Here, in our study we have established the unidimensionality via assessing the overall fit of the CFA model. Following recommendations of the previous scholars, we have used multiple fit criteria to assess model fit (Bentler, 1990; Bentler and Bonett, 1980; Hair et al. 2006). Based on several fit indices (χ^2/df= 1.43; goodness of fit [GFI]=0.94; adjusted goodness of fit [AGFI]=0.91; Bentler and Bonett's normed fit index [NFI]= 0.97; Bentler and Bonett's non-normed fit index [NNFI]= 0.96; Bentler comparative fit index [CFI]=0.99; root mean square residual [RMSR]= 0.04; root mean square error of approximation [RMSEA]=0.03), we can argue that the constructs used in our model possess unidimensionality.

4.2 Convergent and Discriminant Validity Test

We note that all the reliability coefficients are above 0.70, the standardized factor loading of each item is above 0.5 (Hair et al. 2006), the composite reliability is above 0.5 and each AVE is above 0.5 (Hair et al. 2006) (see Table 3). This indicates that the measurements are consistent and the latent construct accounts for at least 50 percent of the variance in the items. Hence, it is evident that our measurement model demonstrates convergent validity. Table 4 shows that the square root of the AVE in the leading diagonal is greater than all the entries in the given row and column (i.e. above correlation coefficient values). The results in Table 4 further suggest that our model possesses discriminant validity.

--- Insert Table 3 about here ---

--- Insert Table 4 about here ---

4.3 Common Method Bias Test

Podsakoff *et al*. (2003) argued that in the case of self-reported data, there is a possibility for common method bias. To test for common method bias we conducted the Harman one-factor test (as suggested by Podsakoff and Organ, 1986) on all five constructs of our model. Results presented in Table 5 indicate that the highest covariance explained by one factor is 30.73 percent meaning the impact of CMB in our study was not an issue. Next, following Guide and Ketokivi (2015) arguments, we have used a method variance (MV) marker to assess the CMB issue (Lindell and Whitney, 2001). We chose a three-item scale that measured information sharing which provided the lowest positive correlation as (r=0.011) between the MV marker and other variables, to adjust the construct correlations and statistical significance (Lindell and Whitney, 2001). None of the significant-correlations became non-significant after the adjustment, so we can argue that CMB was not a serious issue.

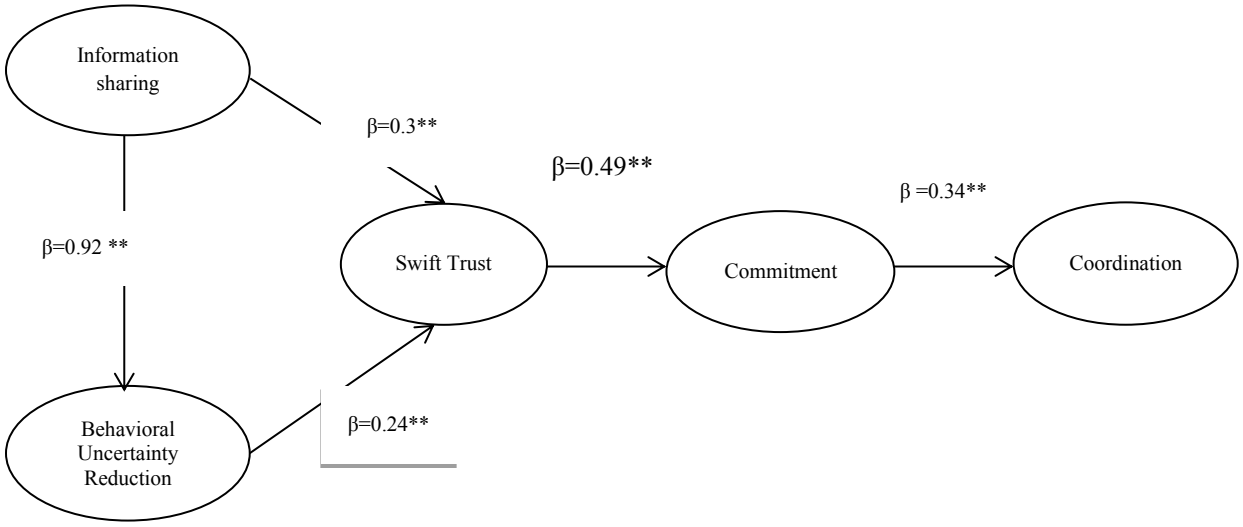
--- Insert Table 5 about here ---

4.3 Hypothesis Testing

The hypothesized structural equation model (Figure 1) was tested using AMOS 24, with variance-co-variance matrices for the latent variables and residual as input. The model fit indices (χ^2/df=1.21; goodness of fit [GFI]=0.97; adjusted goodness of fit [AGFI]=0.92; Bentler and Bonett's normed fit index [NFI]= 0.99; Bentler and Bonett's non-normed fit index [NNFI]= 0.98; Bentler comparative fit index [CFI]=0.97; root mean square residual [RMSR]= 0.03; root mean square error of approximation [RMSEA]=0.04) suggests that the hypothesized model fits the data very well.

Figure 2 represents the results of the five hypothesized relationships (H1-H5) among the study variables. We have found that all the hypothesized relationships were found to be significant at the level of 0.05. One of the major advantage of CBSEM is the ready accessibility to indirect and total effects, in addition to the direct causal effects between the exogenous and endogenous constructs. As we can see that all indirect effects were statistically significant at $p<0.001$ confidence level.

---- Insert Table 6 about here -----



*** represent that the beta coefficient of the path shown in the Figure 2 was significant at p<0.001 level.*

Figure 2: A final causal model

5. Discussion

Our interest in investigating the role of swift trust and commitment in improving coordination among actors in disaster relief is grounded commitment-trust theory. Furthermore, we extend the following research grounded in HRSC that highlight only fractions of our research model. First, Altay and Pal (2014) argue that efficient sharing of quality information among humanitarian actors facilitates coordination and hence an effective response. Second, Tatham and Kovacs (2010) argue that swift trust would improve coordination among actors of HRSCs.

Our model attempts to integrate four independent constructs, information sharing, behavioral uncertainty reduction, swift trust and commitment to explain coordination among actors of HRSCs. We found a significant relationship between information sharing and swift trust (β=0.3, p<0.001)), clearly demonstrating that sharing information builds swift trust among humanitarian

actors. We also observed that information sharing has significant effect on behavioral uncertainty reduction (β=0.92, $p<0.001$). This findings of our further support Kwon and Suh (2004) findings in context to HRSCs. The link between behavioral uncertainty reduction and swift trust is significant (β=0.24, $p<0.001$).

The link between swift trust and commitment is significant (β=0.49, $p<0.001$) (in line for example with the study of Kwon and Suh, 2004). By an additional post-hoc mediation test where we test the indirect effect of commitment on the relationship of trust and coordination we see that commitment plays a strong mediation role. This shows that commitment in HRSCs is a key mediator, but it seems to not automatically emerge as contested by CTT theory. Though being still applicable it seems that different context require different interpretations of CTT. In the context of swift trust CTT is therefore applicable, but less powerful due to the crisis context of the investigation. This observation supports our claim that swift trust has a strong influence on coordination while commitment may take some time to develop (Tatham and Kovacs, 2010). Finally, commitment among the actors in HRSCs have positive impact on coordination among actors (β=0.34, $p<0.001$). This result is found to be consistent with CTT.

5.1 Theoretical Contributions

The role of information sharing (Altay and Pal, 2014) and swift trust (Tatham and Kovacs, 2010) are well understood in the HRSCs literature. What is less understood is how information sharing and swift trust together interact with coordination. Three key aspects of this study signify our contribution to the HRSC literature. First, in this study we explain swift trust using information sharing and behavioral uncertainty. Our results extend the work of Tatham and Kovacs (2010) by establishing links between information sharing and swift trust and testing the relationships empirically.

Second, we explore how swift trust can explain coordination in HRSCs and show that commitment plays a mediating role between swift trust and coordination. Prior studies on coordination in HRSCs identified barriers and enablers of coordination (Balcik *et al*., 2010; Akhtar *et al*., 2012; Kabra and Ramesh, 2015), yet theory focused explanations were not developed. Our attempt to explain coordination among humanitarian actors in HRSCs makes a significant contribution to this literature, particularly by also applying CTT to a new context. CTT plays also an important role in

the context of HRSCs, but interestingly it seems that the onus is more on the antecedents of swift trust to fuel coordination than the immediate link of swift trust and commitment. This might be due to the confounding effects of the context or the notion of swift trust which hasn't been used in CTT.

Third, we developed a framework for explaining coordination among humanitarian actors and tested it using data gathered from governmental and non-governmental organisations. We observed that despite significant differences in organizational culture, structure and size, our framework works the same way in both, governmental and non-governmental organisations to explain coordination in HRSCs.

5.2 Managerial Implications

Our findings offer guidance to organizations involved in disaster relief activities. The study provides insight into building swift trust in rapidly formed temporary networks. Swift trust influences coordination in such networks but the mechanism that leads to coordination has not been explained before. Our study provides an avenue to understand how information sharing helps build trust quickly. Some managers may believe that trust is a prerequisite for sharing information with counterparties but our research indicates that the relationship between trust and information sharing is the other way around, i.e. information sharing builds trust. The findings of our study may also provide useful insights to managers in commercial supply chains who are in crisis management mode responding to major disruptions and need to work with people/organizations that they have not been involved before.

6. Conclusion, Limitations and Further Research Directions

In this study, drawing from CTT and swift trust literature we developed a theoretical framework on the mechanism of coordination and tested it using survey data. Our theoretical framework combines the contribution of two well established streams in literature, studies that explain the impact of information sharing on coordination in humanitarian relief supply chains and swift trust in hastily formed networks to improve coordination. We show that information sharing between organizations build swift trust. We also show that commitment plays a mediating role between swift trust and coordination in HRSCs. Our analyses based on 187 respondents from disaster response organizations in India largely support the hypothesized relationships in the theoretical

model. The study contributes to the humanitarian supply chain literature by building a theoretical framework for coordination in HRSCs and empirically testing it.

While our study comes with clear managerial and theoretical implications, our results come with some limitations and future research directions. First, our study is confined to respondents from India only. This convenience sample does not allow us to generalize our findings. Therefore, we recommend that data gathered from a wider range of international humanitarian organizations be used to compare with our results. Second, our framework is based on information sharing and swift trust theories and does not consider learning where humanitarian actors can adapt to a given situation based on their previous experience and the experience of others. We have no doubt that learning should influence coordination in HRSCs over time. Consequently, we see the inclusion of learning as a potential factor in coordination as future work to ground our framework in terms of experience in disaster relief projects or other humanitarian work. Third, during our study we realized the difficulties in controlling cultural factors and organizational differences in structure that change over a period. Therefore, we think a longitudinal study with panel data would be very helpful in the identification and analysis of fixed and random effects. And lastly, forth, our study was motivated by a literature review which showed a need for theory building in HRSCs smanagement literature. We utilized surveys in our current research, but since disaster relief is multi-disciplinary work, a mixed-methods approach borrowing constructs and theories from other disciplines may provide better insights to explain coordination among humanitarian actors.

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Table 1. Construct Operationalization

Construct	Types	Relevant Literature	Survey items
Information Sharing	Reflective	Zhou and Benton, 2007; Hsu et al., 2008; Yigitbasioglu, 2010	1. Use of compatible information systems. 2. Sharing of information related to various resources deployed for relief activities. 3. Existence of a joint information center for effective sharing of information.
Behavioral Uncertainty Reduction	Reflective	Weed and Mitchell, 1980 Kwon and Suh, 2004	1. There is clarity of roles. 2. Getting along with my work group. 3. Organize my work. 4. Seeking help when necessary.
Swift Trust	Reflective	Tatham and Kovacs, 2010; Robert et al., 2009;Hung et al., 2004	1. I find my colleagues trustworthy. 2. Most people tell the truth about their knowledge. 3. Clear rules for classification of processes and procedures. 4. Trust based on third party reference.
Commitment	Reflective	Morgan and Hunt, 1994; Kwon and Suh, 2004, 2005; Wu et al., 2004; Jin et al., 2013	1. Impact of relationship termination on the goal of disaster response. 2. Observed improvement in coordination. 3. Organizations share values.
Coordination	Reflective	Balcik et al., 2010 Akhtar et al., 2012 Basnet, 2013	1. We consult other members before making decisions. 2. We understand the pressures and concerns of each other. 3. We synchronize our activities with each other.

Table 2. Profiles of the respondents

Organizations	Title	Number of respondents	Percent
Military	Brigadier	34	18.18
	Colonel	18	9.63
	Lieutenant Colonel	23	12.30
	Major	3	1.60
	Captain	1	0.53
	Lieutenant	3	1.60
State Police Department	Director General of Police or Commissioner of Police	4	2.14
	Additional Commissioner of Police or Inspector General of Police	2	1.07
	Joint Commissioner of Police or Deputy Inspector General of Police	2	1.07
	Deputy Commissioner of Police or Senior Superintendent of Police	3	1.60
	Additional Deputy Commissioner of Police or Additional Superintendent of Police	4	2.14
	Assistant Commissioner of Police or Deputy Superintendent of Police	15	8.02
Indian Railway Disaster Response Team	General Manager	1	0.53
	Additional General Manager	1	0.53
	Divisional Railway Manager	5	2.67
	Additional Divisional Railway Manager	4	2.14
NGOs	Vice President	16	8.56
	General Manager	7	3.74
	Senior Manager	7	3.74
	Manager	12	6.42
	Deputy Manager	12	6.42
	Assistant Manager	10	5.35

Table 3. Loadings of the Indicator Variables and Average Variance Extracted (AVE)

Construct	Indicator	Factor Loading	Variance	Error	SCR	AVE
Information Sharing (IS)	IS1	0.85	0.72	0.28	0.87	0.70
	IS2	0.84	0.71	0.29		
	IS3	0.81	0.66	0.34		
Behavioral Certainty (BC)	BU1	0.99	0.99	0.01	0.97	0.90
	BU2	0.98	0.96	0.04		
	BU3	0.92	0.85	0.15		
	BU4	0.90	0.81	0.19		
Swift Trust (ST)	ST1	0.97	0.94	0.06	0.98	0.91
	ST2	0.96	0.93	0.07		
	ST3	0.96	0.93	0.07		
	ST4	0.94	0.88	0.12		
	ST5	0.93	0.87	0.13		
Commitment (C)	C1	0.97	0.95	0.05	0.97	0.92
	C2	0.93	0.86	0.14		
	C3	0.97	0.94	0.06		
Coordination (CO)	CO1	0.71	0.50	0.50	0.81	0.59
	CO2	0.73	0.54	0.46		
	CO3	0.86	0.74	0.26		

Table 4. Correlation Table

	IS	*BU*	*ST*	*C*	*CO*
IS	*0.84**				
BU	0.35	*0.95**			
ST	0.24	0.39	*0.95**		
C	0.07	0.21	0.18	*0.96**	
CO	0.23	0.14	0.04	0.04	*0.77**

* *represent square root of AVE*

Table 5. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.527	25.148	25.148	4.527	25.148	25.148	3.353	18.627	18.627
2	3.359	18.660	43.809	3.359	18.660	43.809	2.982	16.568	35.195
3	1.949	10.830	54.639	1.949	10.830	54.639	2.924	16.244	51.439
4	1.756	9.755	64.394	1.756	9.755	64.394	2.055	11.417	62.856
5	1.359	7.551	71.944	1.359	7.551	71.944	1.636	9.089	71.944
6	1.063	5.907	77.852						
7	.737	4.092	81.944						
8	.675	3.749	85.693						
9	.579	3.215	88.908						
10	.472	2.622	91.531						
11	.385	2.141	93.672						
12	.273	1.518	95.190						
13	.235	1.305	96.494						
14	.203	1.130	97.624						
15	.187	1.037	98.661						
16	.132	.731	99.392						
17	.109	.608	100.000						
18	-1.318E-017	-7.324E-017	100.000						

Extraction Method: Principal Component Analysis.

Table 6. Summary of Hypotheses Testing

Path	**Direct Effect**	**Indirect Effect**	**Total Effect**	***P***	**Supported/Not supported**
H1: IS→ST	0.3	(0.080)	0.38	$p<0.001$	Supported
H2: IS→ BC	0.92	---------	---------	$p<0.001$	Supported
H3: BC→ST	0.24	---------	---------	$p<0.001$	Supported
H4: ST→C	0.49	---------	---------	$p<0.001$	Supported
H5: C→CO	0.34	---------	---------	$p<0.001$	Supported